

10/508909  
DT15 Rec'd PCT/PTO 23 SEP 2004

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23 April 2004

Your ref:

Our ref: TS6632/PCT (old reference W5423TS6632F)

International Patent Application No. PCT/EP 03/03172  
KRATON Polymers Research B.V.

Dear Sir or Madam

Reference is made to the 2<sup>nd</sup> Written Opinion pursuant to PCT Rule 66, dated February 2, 2004. Please note that the case will be handled henceforth by me and kindly direct all correspondence to my office in Amsterdam. We will no longer use Mr. Tom Beetz as our agent in respect of this case.

With respect to item V, the reasoned statement under Rule 66.2(a)(ii) with regard inventive step, we comment as follows.

The Examiner has selected D1 (US-A-5777039) as the nearest state of the art. This reference concerns radiation curable compositions based on asymmetric radial block copolymers. These block copolymers have a vinyl content in the range of from 25 to 70% by weight, a polystyrene content in the range of from 10 to 50 percent by weight, a coupling efficiency of less than 90% and a total apparent molecular weight (as measured by GPC) in the range of from 100,000 to 500,000. These block copolymers may further have a step I apparent molecular weight in the range from 7,000 to 20,000.

According to the Examiner, it would be part of the normal activities of the person skilled in the art to select from the ranges given in D1 those who provide hot melt adhesive compositions having low hot melt viscosity and good properties with regard to tack and adhesive strength.

It would appear that the Examiner is assuming that the present invention follows plainly and logically from the prior art. However, there is no information in D1 at all suggesting a step I molecular weight between 9,000 and 10,000 kg/mol. Rather, the molecular weight mentioned on line 3, column 12 is in the amount of 14,520. This is well above the 10,000 limit. Also the vinyl contents of the polymers P1 to P6 are all (much) greater than 45%. Without any guidance to go by, we do not agree that the present invention follows plainly and logically from the prior art.

The subject matter of D2 has been discussed on page 2, 3<sup>rd</sup> paragraph of the International application. Thus, D2 advocates the use of block copolymers having a [S] and [V] content that meet certain conditions.

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The step 1 molecular weight does not appear to be an important feature in the eyes of the inventors of D2. This criterion is not discussed at all.

Example F\* in our patent specification is not an actual example disclosed in D2. It is an example in accordance with this prior art. Thus, it has an [S] content of 19 (within the range of 10 to 30); a [V] content of 30 (within the range of 20 to 50) and the combination of [V] and [S] is 49 (within the range of 40 to 70). Moreover, the MFR is 5, similar to the examples in this prior art reference.

Although the comparative example that we choose is very close to the definition of the block copolymer according to the present invention, it differs in respect of the step 1 molecular weight. As mentioned on page 11 of the specification, Polymer F\* results in a far too high HMV for packaging tape formulation.

Nowhere is it disclosed in D2 that the styrenic block copolymers thereof could be improved by selecting styrenic block copolymers simultaneously meeting the criteria of PSC, CE, step 1 molecular weight and vinyl. We therefore do not agree that the subject matter of the present invention lacks inventive step over D1 or a combination of D2 and D1.

We enclose replacement pages 8, 14 and 15.

We have included the MFR requirement in claim 1 (MFR equal to or greater than 10). As claim 5 refers to the polymer of claim 1, the MFR requirement for claim 5 is also dealt with. Moreover, claim 5 has been brought into line with the specification by including the expression "optional". The reader skilled in the art will be quite familiar with hot melt adhesive compositions and will know that the presence of a plasticizer is generally preferred, but not essential.

We concur with the Examiner regarding the priority claim as it concerns the subject matter of claim 6. To avoid potential problems in subsequent proceedings, the part for which the priority claim is correct is now (new) claim 7. Claim 6 is maintained, albeit without claim to the first priority date.

Test methods for hot melt adhesives on peel, tack, cohesion and viscosity are quite standard. They are for instance described in the Test method manual for Pressure Sensitive Tapes from the Pressure Sensitive Tape Council. In addition there are the standard FINAT test method for pressure sensitive materials, the AFERA test methods for pressure sensitive adhesive tapes and the ASTM related methods.

Rolling Ball Tack (RBT) is the distance, expressed in centimeters a steel ball rolls on the adhesive film with a standard initial velocity. It is measured according to ASTM D3121-73 (= PSTC 6). Flap test is a test developed to simulate the closure force of a tape on a cardboard box. An example of the instrument one can use is found in e.g. US4699938. In the present case, an instrument was used, developed by E.T.S. Holland, wherein an adhesive strip is stuck on Kraft paper and a weight of 1 kg is applied on one end of the strip. The Flap test determines the time needed for the bond on the Kraft paper to fail. Holding Power (HP) is the time required to pull a standard area (1.3 x 1.3 cm) of tape from a standard test surface under a standard load, in shear at a 2° angle the PSTC Method No. 7; ASTM D 3654-82). Finally HMV is measured with a rotational viscometer according to ASTM D-3236-78. The viscosity is measured by the torque required to rotate a spindle at constant speed while immersed in a fluid. A sample is placed in a RVTDV-II equipped with a Brookfield Thermocell and the hot-melt viscosity is measured in a temperature range of 120 to 190 °C. The results are expressed in Pascalsecond (Pa.s).

These standard test methods are for instance described in WO 02/057386, pages 15-17.

We have included this description of the standard tests in replacement page 8.

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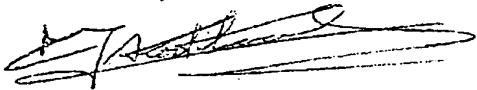
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Should any further clarification be required in respect of the inventive step or the text of the invention, then we will do our best to respond quickly to a further Written Opinion

Yours faithfully

KRATON Polymers Research B.V.



M.C.J.A. Kortekaas (GA 43691)

Encl: Amendment pages 8, 14 and 15

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HP40°C, 1kg weight

Flap test, 500g weight

These tests have shown that in order to attain the object of the present invention, the adhesive composition of (poly(styrene-butadiene-styrene) polymers having a high vinyl content in the butadiene blocks based packaging tapes) ideally should fulfill the following requirements:

RBT: 1-5 cm (acceptable < 20 cm)  
Flap test: 120-250 minutes (acceptable > 100 minutes)  
HP40°C: 50-100 minutes (acceptable > 40 minutes)  
EMV < 100 Pa.s.

The tests have been performed with the following polymers A to H, whereby A to F are comparative examples while G and H are embodiments of the present invention.

Rolling Ball Tack (RBT) is the distance, expressed in centimeters a steel ball rolls on the adhesive film with a standard initial velocity. It is measured according to ASTM D3121-73 (= PSTC 6). Flap test is a test developed to simulate the closure force of a tape on a cardboard box. An example of the instrument one can use is found in e.g. US4699938. In the present case, an instrument was used, developed by E.T.S. Holland, wherein an adhesive strip is stuck on Kraft paper and a weight of 1 kg is applied on one end of the strip. The Flap test determines the time needed for the bond on the Kraft paper to fail. Holding Power (HP) is the time required to pull a standard area (1.3 x 1.3 cm) of tape from a standard test surface under a standard load, in shear at a 2° angle the PSTC Method No. 7; ASTM D 3654-82). Finally EMV is measured with a rotational viscometer according to ASTM D-3236-78. The viscosity is measured by the torque required to rotate a spindle at constant speed while immersed in a fluid. A sample is placed in a RVTDV-II equipped with a Brookfield Thermocell and the hot-melt viscosity is measured in a temperature range of 120 to 190 °C. The results are expressed in Pascal.second (Pa.s).

C L A I M S

1. Poly(styrene-butadiene-styrene) polymer having a high vinyl content in the butadiene block comprising in combination
- i) a polystyrene content (PSC) within a range of 15-20% by weight
  - ii) a coupling efficiency (CE) of 50-80%
  - iii) a step I molecular weight (MW) between 9,000 and 10,000 kg/mol
  - iv) a vinyl content between about 20-45%, and
  - v) a MFR of equal to or greater than 10.
2. The polymer according to claim 1 wherein the polystyrene content (PSC) is within a range of 16-19% by weight, preferably 16-18% by weight.
3. The polymer according to claim 1 wherein the coupling efficiency is within a range of 60-75%, preferably 65-70%.
4. The polymer according to claim 1 wherein the vinyl content amounts to 25-40% preferably 30-35 by weight.
5. Hot melt adhesive composition comprising:
- a) a poly(styrene-butadiene-styrene) polymer having a high vinyl content in the butadiene block according to any one of claims 1 to 4;
  - b) a tackifying resin;
  - c) optionally a plasticizer; and
  - d) an anti-oxidant.
6. The hot melt adhesive composition according to claim 5 characterized in that said polymer has the following characteristics
- |                               |                  |
|-------------------------------|------------------|
| Polystyrene (PSC) content (%) | 16-19            |
| CE (%)                        | 60-75            |
| Step I (MW) (kg/mol)          | 9,400-9,600, and |
| Vinyl (%)                     | 25-40.           |

7. The hot melt adhesive composition according to claim 6 characterized in that said polymer has the following characteristics

|                               |             |
|-------------------------------|-------------|
| Polystyrene (PSC) content (%) | about 19    |
| 5 CE (%)                      | about 70    |
| Step I (MW) (kg/mol)          | about 9,500 |
| Vinyl (%)                     | about 30.   |

8. The hot melt adhesive composition according to any one of claims 5 to 7 having

- 10 a) hot melt viscosity at 170°C during 24 hours lower than 100 Pa.S (ASTM D3236-78)
- b) Rolling back tack: 1-5 cm (ASTM D3121-73)
- c) Flap test, 500 g weight: higher than 120 minutes (test method herein described)
- 15 d) HP 40°C, 1 kg weight: higher than 50 minutes (ASTM D3654-82).

9. The hot melt adhesive composition according to any one of claims 5 to 9 wherein the amount of tackifier in the composition comprises 50 to 200 parts by weight, preferably

20 100 to 150 parts.

10. The hot melt adhesive composition according to any one of claims 5 to 9 wherein the amount of plasticizer in the composition is up to 100 parts by weight, preferably 5 to 75 parts by weight.